

ABSTRACT OF THE DISCLOSURE

A method for forming capacitor of semiconductor device wherein a stacked structure of Al-rich $\text{HfO}_2\text{-Al}_2\text{O}_3$ film and Hf-rich $\text{HfO}_2\text{-Al}_2\text{O}_3$ film or a stacked structure of Al_2O_3 film and Hf-rich $\text{HfO}_2\text{-Al}_2\text{O}_3$ film is used as a dielectric film is disclosed. The method comprises (a) forming an oxide film on an interlayer insulating film having a storage electrode contact plug; (b) selectively etching the oxide film to form an opening exposing the top surface of the storage electrode contact plug; (c) forming a conductive layer on the bottom and the inner walls of the opening; (d) removing the oxide film to form a storage electrode; (e) forming a dielectric film having a stacked structure of Al-rich $\text{HfO}_2\text{-Al}_2\text{O}_3$ film and Hf-rich $\text{HfO}_2\text{-Al}_2\text{O}_3$ film on the surface of the storage electrode; (f) annealing the dielectric film; and (g) forming a plate electrode on the dielectric film.